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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/751,898	01/07/2004	Shosuke Endoh	247409US2	3795
22850	7590	03/24/2008		
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314				
EXAMINER				
MACARTHUR, SYLVIA				
ART UNIT		PAPER NUMBER		
1792				
NOTIFICATION DATE		DELIVERY MODE		
03/24/2008		ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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### Office Action Summary

**Application No.**

10/751,898

**Applicant(s)**

ENDOH ET AL.

**Examiner**

Sylvia R. MacArthur

**Art Unit**

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12/18/2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12, 14-19 and 21-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12, 14-19 and 21-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

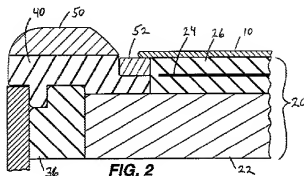
**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments filed 12/18/2007 have been fully considered but they are moot considering the amendment to claims 1 and 14 wherein the location of the ring member and lower ring body necessitated the discussion of Figs. 1 and 2 of Ma et al (US 6,554,954) and the amendment to claim 12 wherein it is recited that the whole ring member is located directly on the electrostatic chuck necessitated the introduction of the prior art of Hubacek (US 6,475,336).
2. It is noted on page 10 that applicant argues that the prior art of Ma et al (namely Fig.5) fails to teach that an inner circumference of the ring member 56 or 58 surrounds a periphery of the substrate. The basis of this argument relied upon the size and shape of the substrate which is not part of the apparatus, see In re Young as restated in In re Otto, wherein the inclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims. The examiner opines that the apparatus of Ma is structurally capable of using a smaller substrate such that gap will be as recited. See also Fig.2 (a copy of which is provided below) of Ma wherein a susceptor 22, chuck 26, the ring member 50, and lower ring 52 are illustrated. The examiner maintains the rejections of claims 1, 5,6, 8, 10, 11, 14,16,17, and 19 on the basis that the claim limitations are relative to the substrate which is does not structurally limit the apparatus, and also introduces a discussion of Fig.2 of Ma et al that also meets the claim.



### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 5, 6, 8, 10, 11, 14, 16, 17, and 19 are rejected under 35 U.S.C. 102(e) as being anticipated by Ma et al (US 6,554,954).

Ma et al teaches a conductive collar surrounding a semiconductor workpiece in a plasma chamber. Refer to Figs. 1, 2, and 5.

Regarding claims 1 and 14:

The apparatus comprises a plasma processing chamber

(abstract), a (metal is both electrically and thermally conductive, see col. 3 lines 1-5) susceptor 22, an electrostatic chuck 26 a ring member 58 also believed to be element 56, and a lower ring body 48, see Fig.5 and Fig.2 wherein the lower ring body is 52 and ring member is 50. For Fig.5, the size and shape of the substrate is the basis of the location of the ring member and lower body

which is not part of the apparatus, see *In re Young* as restated in *In re Otto*, wherein the inclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims. The examiner opines that the apparatus of Ma is structurally capable of using a smaller substrate such that gap will be as recited.

Regarding claims 5, 6, 8, 16, 17: The claims depend upon the substrate regarding the material of construction, impedance, and thickness. Note that the invention is held to an apparatus which is what it is and not what it does, such that the substrate is not included in the apparatus, and the apparatus of Ma et al is inherently capable of constructing a ring member relative to the substrate as recited. Note that the inclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims. *In re Young*, 75 F. 2d, 25 USPQ 69.

Regarding claims 10 and 19: The susceptor 22 comprises a conductive lower electrode according to col.2 lines 49-59. How the ring member 58, 50 is formed is a product by process limitation and does not structurally limit the ring member of Ma et al.

Regarding claim 11: The lower ring body 48, 52 of Ma et al could inherently perform the function of protecting the susceptor. The use of the lower ring body does not structurally limit the apparatus.

5. Claims 12, 21, 26, 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Hubacek (US 6,475,336).

Hubacek teaches a plasma processing chamber, a susceptor, an electrostatic chuck 14, 36, 34, 17, 50, and a ring member 18, 30, 44, 62, wherein the whole (interpreted as entire) ring

member is located directly on the chuck and a lower surface of the ring member is higher than an upper surface of the electrostatic chuck, see Figs.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 2-4, 7, 12, 15, 21, 23, and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ma et al.

Claims 2-4, and 15: The dimensions of the ring especially the thickness is related to the impedance according to the specification page 14 of the present invention.

The dimensions of the components of the plasma chamber especially the ring members and lower ring members are a matter of optimization. The thickness of the ring members and lower ring members affect the transport of plasma around the substrate and the amount of protection provided to the substrate edge. It is well settled in that the determination of optimum values of cause effective variables such as the dimensions of the ring and lower ring member is within the skill of one practicing in the art. In re Boesch, 205 USPQ 215 (CCPA 1980). Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to design the lower ring and the ring member to provide optimal thickness that would result in the optimal impedance to produce the optimal amount of plasma to process the wafer.

Regarding claims 7, 23, 25, and 26: The substrate is not part of the apparatus and is seen as a matter of an intended use. Note that the inclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims. In re Young, 75 F. 2d, 25 USPQ 69.

Furthermore the prior art of Ma et al fails to teach the thickness of the substrate as being related to the impedance. The motivation to provide the dimensions of Ma et al or Koshihi et al within the ranges of claims 5-8 is to provide the optimal physical parameters of protection to the wafer for processing and provide the desired impedance. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the dimensions of the ring member within the ranges of claims 5-8a and 20 as a matter of optimization.

Regarding claims 12, 21, 26, and 27: Ma Fig. 5 fails to illustrate or teach that the entire upper surface of the susceptor is covered with the electrostatic chuck. Ma teaches in col.2 lines 60-67 that the electrostatic chuck 26 serves to securely hold the workpiece against the front surface of the pedestal (susceptor). Ma illustrates that a majority of the face of the upper surface of the susceptor is covered by the chuck. It is the examiner's position that the motivation to design the susceptor/chuck such that the chuck covers the susceptor's entire upper surface in order to ensure that the workpiece is secured along its entire length and such designing is a matter of optimization. Thus, it would have been obvious for one ordinary skill in the art at the time of the claimed invention to ensure that the workpiece is amply secured onto the susceptor via the chuck.

8. Claims 9 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ma et al in view of Tong et al (US 2004/0083975).

The teachings of Ma et al were discussed above.

Ma et al fails to teach the materials of construction as discussed in claims 9 and 18 of the claimed invention.

Tong et al teaches a hot edge ring 108 surrounding an electrostatic chuck wherein the chuck is made of such materials as SiC and silicon.

Tong et al teaches that the material of construction of the edge ring the degree of coupling through the plasma can be tailored to provide a desired localized "edge" etch rate at the outer portion of the substrate being processed, see [0026 of Tong et al].

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to construct the ring of Ma et al with the materials disclosed by Tong et al.

9. Claims 22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ma et al in view of Hubacek (US 6,475,336).

The teachings of Ma et al were discussed above. Ma et al fails to teach that the whole lower ring is inserted into a groove formed on the susceptor.

The teachings of Hubacek were discussed above. Hubacek illustrates in Fig. 5 the conventionality of constructing rings so as to fit within a groove (recess) see col.2 lines 18-30 and col. 5 lines 8-33. The motivation of constructing the lower ring of Ma et al so as to fit within a groove of susceptor as Hubacek teaches is a way to ensure that there is a snug fit allowing the ring of Ma to endure the harsh semiconductor manufacturing environment.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to construct the lower ring to snugly fit within the susceptor via a groove.

### ***Conclusion***



10. Applicant's amendment regarding the location of the ring member and lower ring body necessitated the discussion of Figs. 1 and 2 of Ma et al (US 6,554,954) , as seen in claims 1 and 14 of the present invention and the amendment of claim 12 reciting that the whole ring member is located directly on the electrostatic chuck e necessitated the introduction of the prior art of Hubacek (US 6,475,336) new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).
11. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.
12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-Th during the hours of 8 a.m. and 4:30 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax

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phone number for the organization where this application or proceeding is assigned is 571-273-8300.

13. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

March 16, 2008

/Sylvia R MacArthur/  
Primary Examiner, Art Unit 1792